Electronic Supplementary Material (ESI) for Nanoscale.


# Supporting Information

# Nonuniform Functional Group Distribution of Carbon Nanotubes Studied by Energy Dispersive X-ray Spectrometry Imaging in SEM

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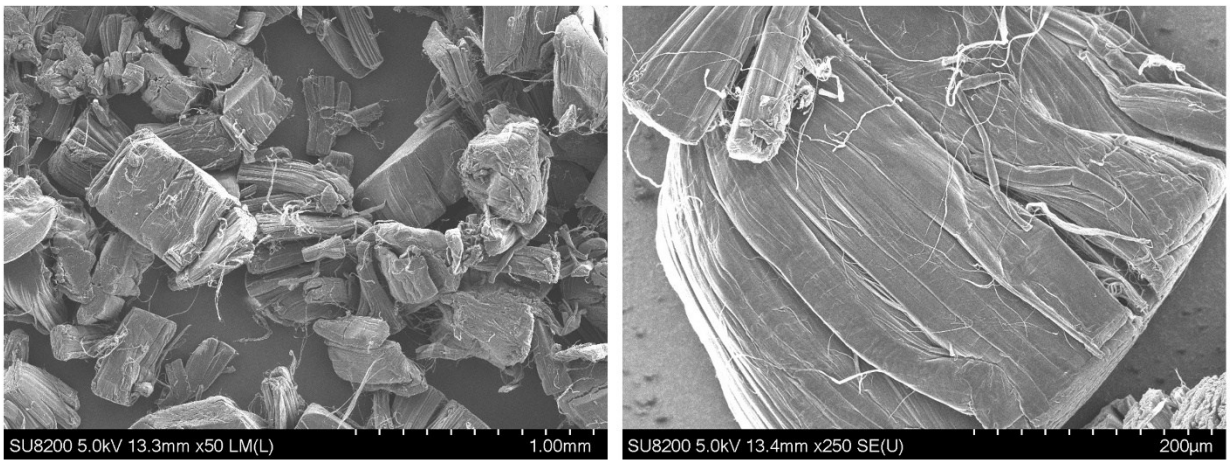


**Figure S1.** SEM images of as-grown super-growth SWCNT forests.

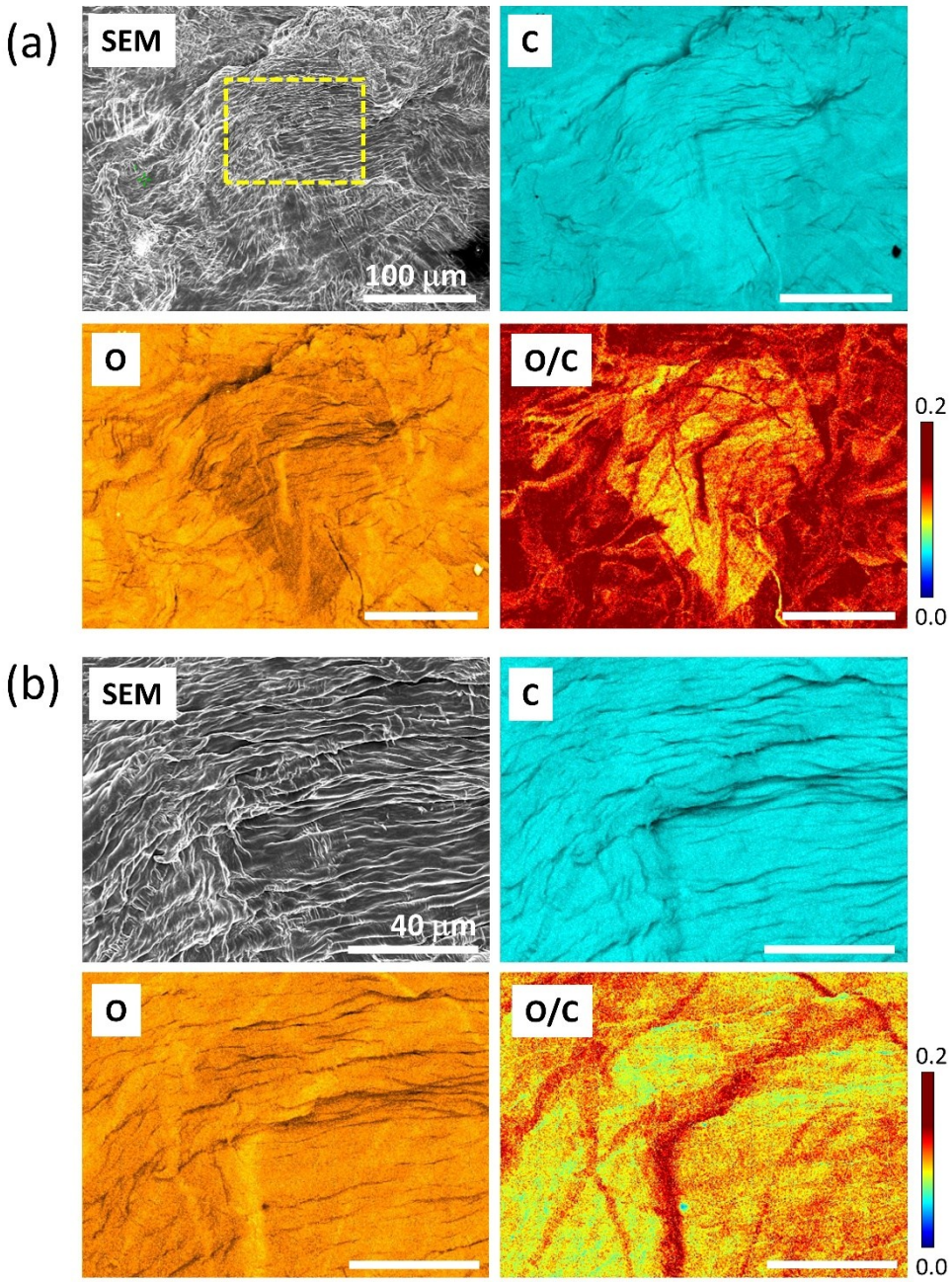


**Figure S2.** SEM-EDS images of $KMnO_4/H_2SO_4$ buckypaper at (a) low magnification (x350). A forest-like structure appears in the O/C image. (b) corresponds to an expanded view the area inside the yellow dashed line in (a) at a magnification of x 1,000.

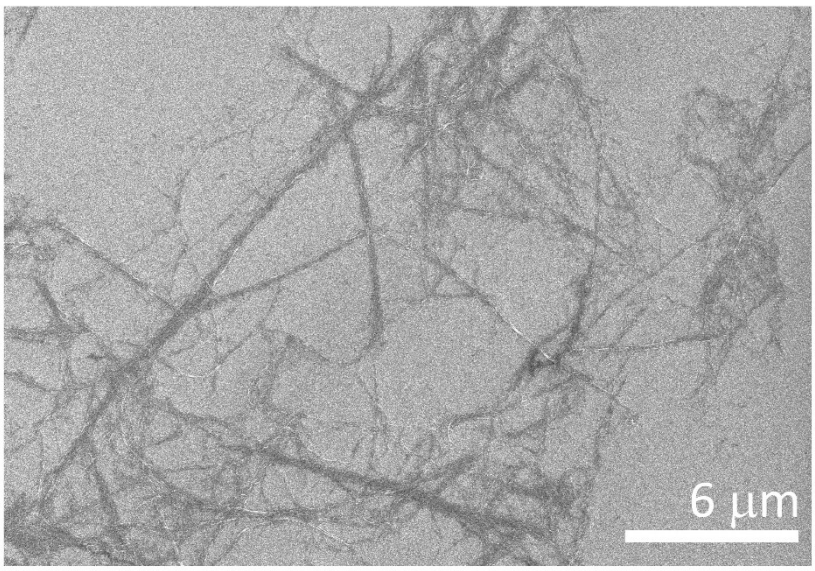


**Figure S3.** SEM image of $KMnO_4/H_2SO_4$-treated SWCNTs transferred onto Si substrate.

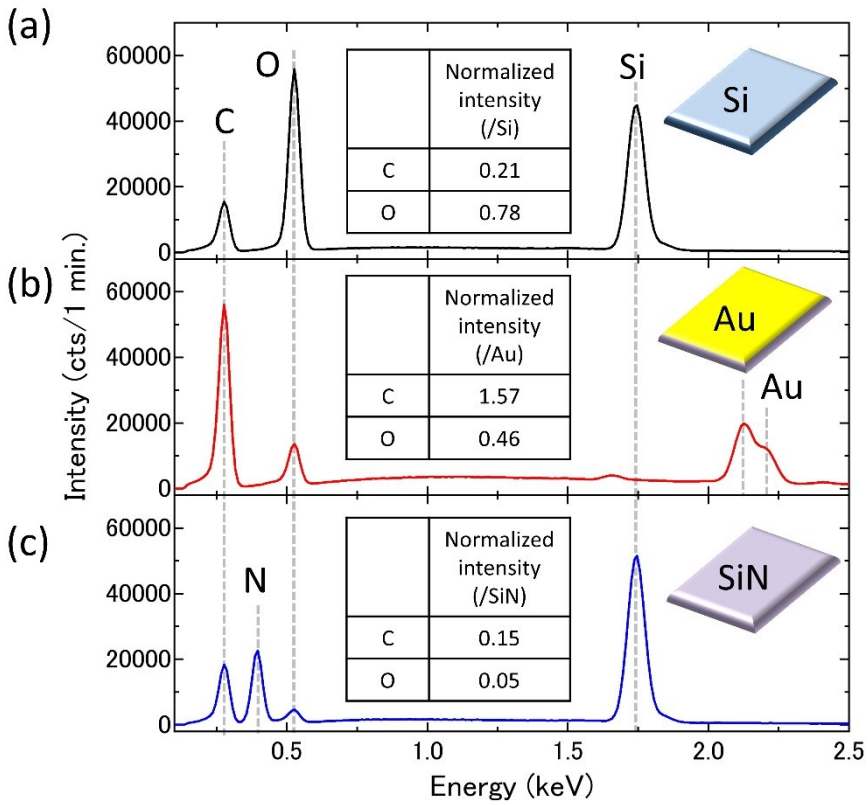


**Figure S4.** EDS spectra from (a) Si, (b) Au, and (c) $Si_3N_4$ substrate. The inset tables indicate normalized intensities of C and O components from each corresponding substrate. By using a $Si_3N_4$ substrate, oxygen generation is much suppressed as low as < 0.1 atm%.

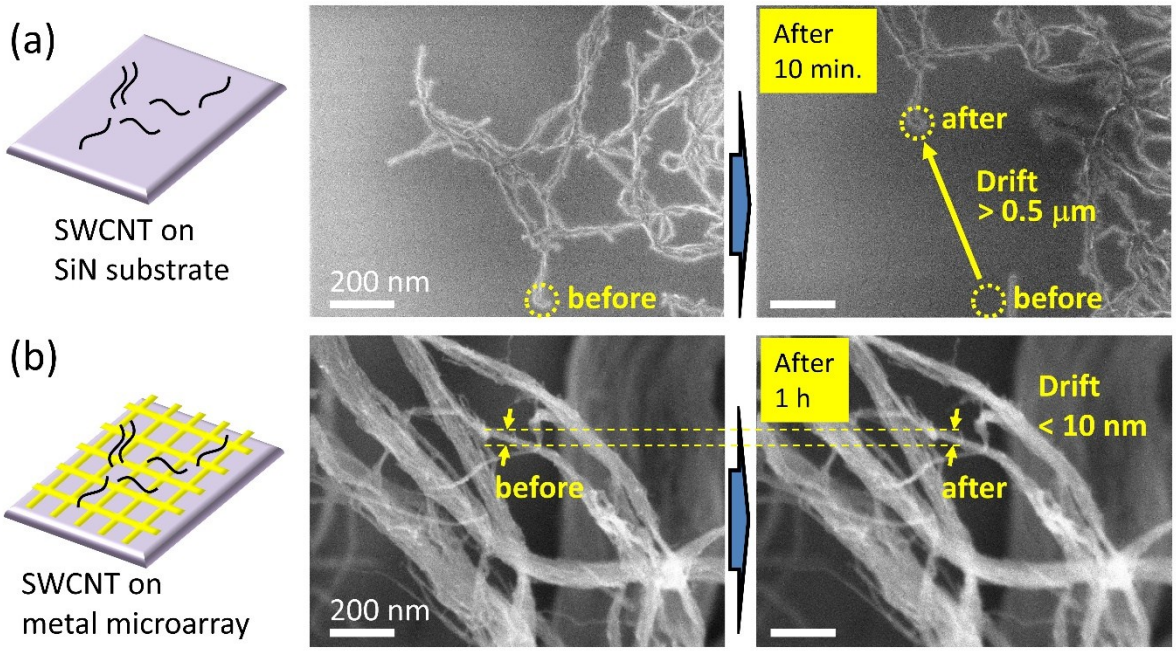


**Figure S5.** Monitoring the SEM measurement of SWCNT on $Si_3N_4$ substrate (a) without and (b) with a patterning metal microarray. (a) Significant imaging drift was observed due to the effect of charging by electron-beam irradiation. (b) Drift is suppressed by using a metal microarray during 1 hour of observation.

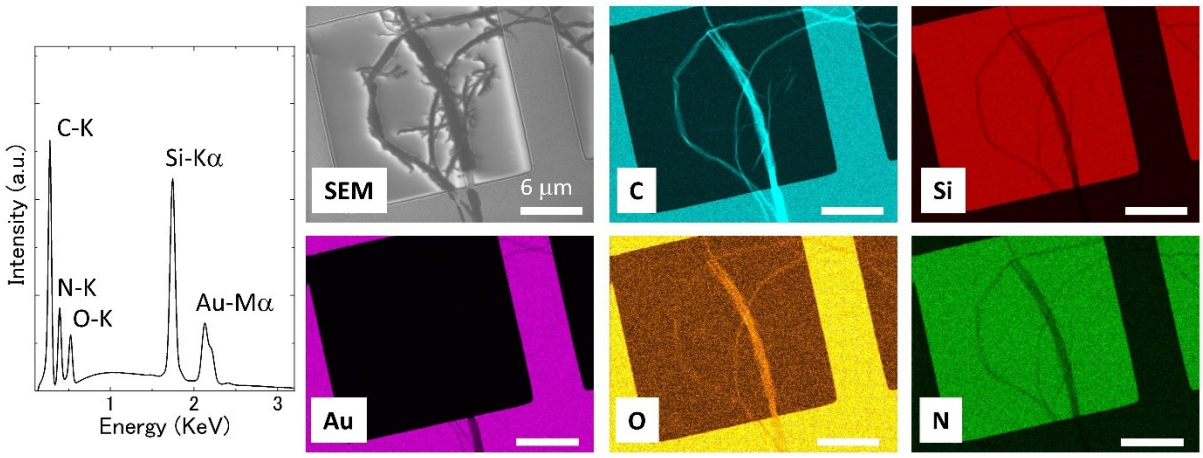


**Figure S6.** EDS images of SWCNT bundle structures on metal-microarray/$Si_3N_4$ substrate. The results are for SEM, C, Si, Au, O, and N. The left figure indicates the obtained EDS spectrum.

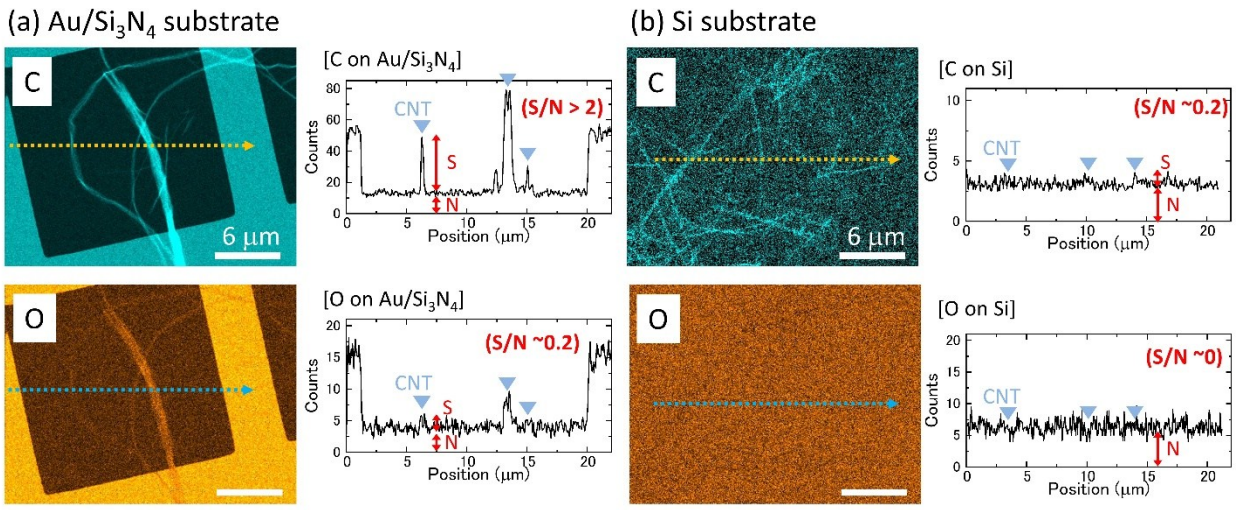


**Figure S7.** Result of line profile analysis of EDS imaging with (a) a metal-microarray on $Si_3N_4$ substrate (Figure 4d) and a Si substrate (Figure 4b). The estimated S/N ratio of imaging contrast are also listed. Here, we defined the S/N ratio as signal intensity divided by noise intensity.

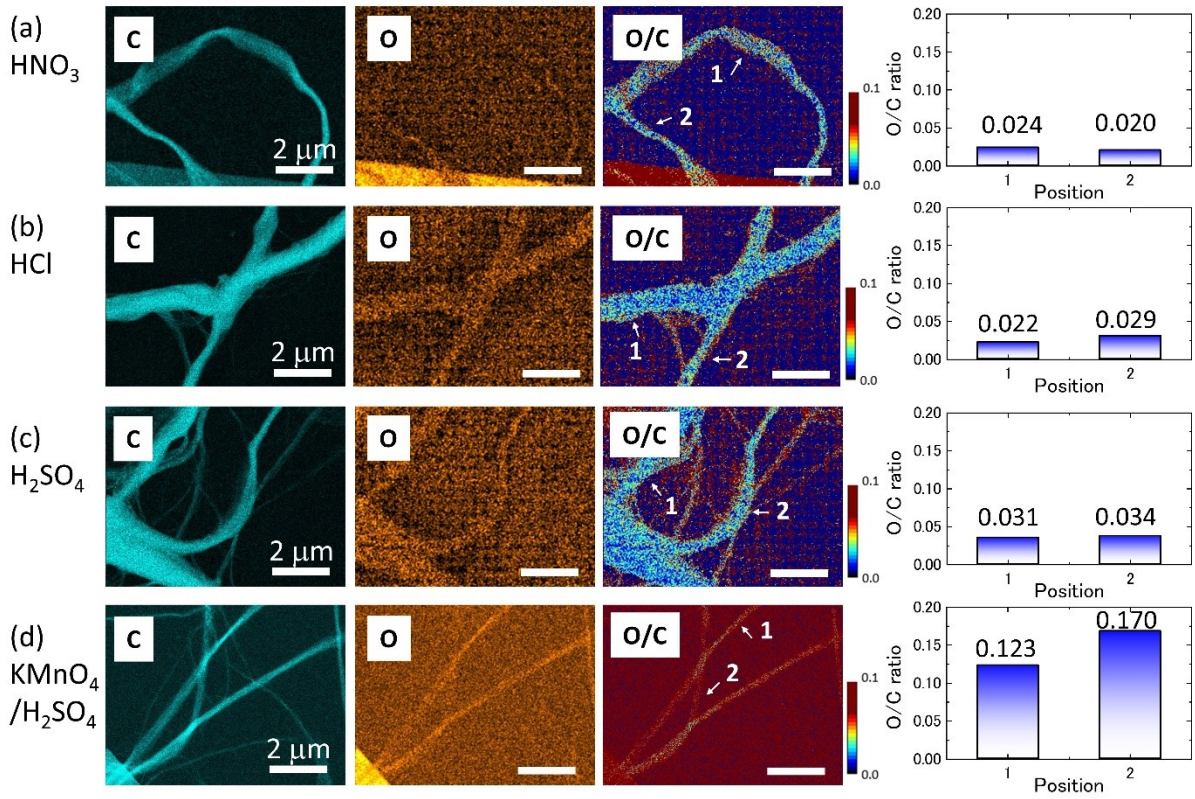


**Figure S8.** EDS imaging results with metal-microarray/$Si_3N_4$ substrate for each SWCNT sample.